

6.3 BSAI King and Tanner Crab

Stocks of BSAI crabs have widely varying levels of information available. Some stocks have only limited fishery data while Bristol Bay red king and Tanner crabs have been studied intensely. In reviewing the array of information, the technical team defined five life history stages for crab based on their habitat requirements and five information levels to describe and identify EHF. The team noted that the type and level of information available for most BSAI crabs' life stage was minimal compared to the expectations of the national guidelines for description and identification of EFH.

Life Stages

Life history stages of king and Tanner crabs were defined according to accepted habitat usage: eggs, larvae, early juveniles, late juveniles, and mature crabs (Tyler and Kruse 1996, 1997; Epifanio 1988).

Egg Stage

Female king and Tanner crab extrude eggs, carry and nurture them outside the maternal body. The number of eggs developed by the female increases with body size and is linked to nutrition at favorable temperatures. Information on egg bearing females is used to define habitat for the egg stage of crabs.

Larval Stage

Successful hatch of king and Tanner crab larvae is a function of temperature and concentration of diatoms so presence of larvae in the water column can vary accordingly. Larvae are planktonic. They are minute forms and their sustained horizontal swimming is inconsequential compared to horizontal advection by oceanographic conditions. Larvae vertically migrate within the water column to feed. Diel vertical migration may be a retention mechanism to transport larvae inshore.

Early Juvenile Stage

The early juvenile stage includes crabs first settling on the bottom (glacothoe and megalops), young of the year crabs, and crabs up to a size approximating age 2. Habitat relief is obligatory for red and blue King crabs of this life stage. Individuals are typically less than 20mm CL distributed in nearshore waters among niches provided by sea star arms, anemones, shell hash, rocks and other bottom relief. Early juvenile Tanner crab settle on mud, are known to occur there during summer but are not easily found in this habitat in winter.

Late Juvenile Stage

The late juvenile stage for crab is defined as the size at about age 2 to the first size of functional maturity. Late juvenile crabs are typically found further offshore in cooler water than early juvenile crabs. Smaller red king crabs of this life stage form pods during day that break apart during the night when the crabs forage and molt. As these crabs increase in size, podding behavior declines and the animals are found to forage throughout the day.

Mature Stage

Mature crabs are defined as those crabs of a size that is functionally mature. Functional maturity is based on size observed in mating pairs of crabs. This maturity definition differs from morphometric maturity based on chela height and physiological maturity when sperm or eggs can be produced. The mature stage includes crabs from the first size of functional maturity to senescence.

Information Levels

The type of habitat information available for almost all crab species is spatial distribution over depth and broad geographic areas as collected from survey and fishery samples that have limited linkage with habitat characteristics. Coupled with traditional knowledge these data demonstrate that geographic distribution of crab contracts and expands due to a variety of factors including, but not limited to, temperature changes, current patterns, changes in population size, and changes in predator and prey distributions. The distributions of many crab species' life stages are based on historical data and information about the entire geographic range is included in the text description of each species. The technical team agreed that maps should delineate where possible the EFH distributions and known areas of high crab concentrations within United States (3-200 nautical miles) and State of Alaska (0-3 miles) waters.

Specific data are lacking to precisely define localized habitat for each life stage of crab because surveys are cost prohibitive to document the expanse of king and Tanner crab habitat along the coast line of the Bering Sea and Aleutian Islands and on the continental shelf and slope. Consequently, the oceanographic (temperature, salinity, nutrient, current), trophic (presence/absence of food and predators), and physical (depth, substrate, latitude, and longitude) characteristics of crab habitat are restricted for most crab species and life stages to broad general associations. Types of data used to describe habitat association of BSAI king and Tanner crabs include: AFSC trawl surveys; the OCSEAP survey, NMFS and ADF&G tagging surveys, ADF&G surveys; ADF&G shellfish observer program; and ADF&G harvest records.

A primary source of many of the maps featured in this document was the NOS publication, Coastal and Ocean Zones Strategic Assessment: Data Atlases of the West Coast of North America and the Bering, Chukchi and Beaufort Seas. These maps provide the reasonable coverage of the distributions of larger crabs. However, the source data depends on the catchability of female crabs and late juvenile crabs in survey gear. Only irregular surveys target larval and early juvenile life stages. Additionally, inaccuracies might exist in extending mapped distributions based on habitat associations. The distributions shown in this preliminary report are first-cut and should be verified and updated as better or more current data become available. Information levels used in description of EFH for crab species were based on the best scientific data available. The Crab Technical Team adopted a classification scheme that includes an additional level of information, level 0. Level 0 is considered a subset of the information level 1 definition in the proposed guidelines. The Crab Technical Team noted that for BSAI crabs, the minimum level of habitat information has been gathered by systematic sampling therefore opportunistic samples of crab have not been included in the assessment of crab EFH. Level 0 denotes absence of systematic sampling data for a species and life stage. Level 1 information is presence/absence of systematic sampling data for a species and life stage and encompasses the area of general distribution for some or all portions of its' geographic range. Level 2 information is density of a crab species' life stage by depth, geographic area and inferred habitat. Information level 2 includes the definition for level 1 and additional data that refines definition of habitat occupied by a species' life stage.

Table 6.6 Levels of essential fish habitat information currently available for BSAI king and Tanner crab, by life history stage. Juveniles were subdivided into early and late juvenile stages based on survey selectivity curves.

Species/Stock	Eggs	Larvae	Early Juveniles ¹	Late Juveniles ²	Adults
<u>Red King Crab</u>					
Bristol Bay	2	2	1	2	2
Pribilof Islands	2	1	0c	2	2
Norton Sound	2	0c	0c	2	2
Dutch Harbor	2	0c	0c	2	2
Adak	1	0c	0c	0c	1
<u>Blue King Crab</u>					
Pribilof Islands	2	1	2	2	2
St. Matthew I.	1	0c	0c	1	2
St. Lawrence I.	0b	0c	0c	0c	1
<u>Golden King Crab</u>					
Seagum Pass	2	0c	0c	2	2
Adak	1	0c	0c	1	2
Pribilof Islands	1	0c	0c	1	2
Northern District	0c	0c	0c	0c	0c
<u>Scarlet King Crab</u>					
Bering Sea	0b	0c	0c	0c	1
Adak	0b	0c	0c	0c	1
Dutch Harbor	0b	0c	0c	0c	1
<u>Tanner Crab (C. bairdi)</u>					
Bristol Bay	2	1	1	2	2
Pribilof Islands	2	1	1	2	2
Eastern Aleutians	1	0c	1	2	2
Western Aleutians	0b	0c	0c	0c	1
<u>Snow Crab (C. Opilio)</u>					
Eastern Bering Sea	2	1	1	2	2
<u>Grooved Crab (C. tanneri)</u>					
Bering Sea	0b	0c	0c	0c	1
Eastern Aleutians	0b	0c	0c	0c	1
Western Aleutians	0b	0c	0c	0c	1
<u>Triangle Crab (C. angulatus)</u>					
Bristol Bay	1	0c	0c	0c	1
Eastern Aleutians	1	0c	0c	0c	1

¹ Early juvenile crab are defined as settled crab up to a size approximating age 2.

² Late juvenile crab are defined as age 2 through the first size of functional maturity.

Note: For any crab species/stock's life stage at level 0, information was insufficient to infer general distribution (0a).

0b: No information on the life stage, but some information on a similar species or adjacent life stage from which to infer general distribution.

0c: No information on the actual species' life stage and no information on a similar species or adjacent life stages, or where complexity of a species stock structure prohibited inference of general distribution.

Recommendation

The Crab Technical Team based description and identification of essential habitat on the level of information available. In cases where a level 0 has been assigned, no data exist and no comment on EFH has been offered. The Crab Technical Team recommends that EFH be defined as everywhere the species' life stage has been documented through systematic sampling, plus all areas of similar habitat based on NOS charts, the literature, and the opinions of scientists and persons with local knowledge. This EFH recommendation would apply to a species' life stage with level 1 and greater information.

The Crab Technical Team did note distinguishing characteristics of crab habitat "necessary for spawning, breeding, feeding and growth to maturity" based on the best available scientific data and collective scientific opinion. Habitat can be partitioned according to depth both between crab species and among different life history stages of a given species.

Shallow inshore areas (less than 50 m depth) are very important to king crab reproduction as they move onshore to molt and mate. Tanner crabs also occupy shallower depths during molting and mating. All BSAI crab are highly vulnerable to predation and damage during molting when they shed their exoskeleton. King crab usually molt annually to mate while Tanner and snow crab exhibit terminal molt and carry sperm for future clutch fertilization. The habitat occupied by molting and mating crab differs from that occupied by mature crabs during the remainder of the year. The Crab Technical Team noted protection of crab in molting mating habitat during this sensitive life history stage is important.

Larval stages are distributed according to vertical swimming abilities, and the currents, mixing, or stratification of the water column. Generally, the larval stages occupy the upper 30 m, often in the mixed layer near the sea surface. As the larvae molt and grow into more actively swimming stages they are able to seek a preferred depth. After molting through multiple larval stages, crabs settle on the bottom. Settlement on habitat with adequate shelter, food, and temperature is imperative to survival of first settling crabs. Young of the year red and blue king crabs require nearshore shallow habitat with significant cover that offers protection (e.g. sea stars, anemones, macroalgae, shell hash, cobble, shale) to this frequently molting life stage. Early juvenile stage Tanner and snow crab also occupy shallow waters and are found on mud habitat. Late Juvenile stage crabs are most active at night when they feed and molt. The Crab Technical Team emphasized the importance of shallow areas to all early juvenile stage crabs and in particular the importance to red and blue king crabs of high relief habitat nearshore with extensive biogenic assemblages. The area north and adjacent to the Alaska peninsula (Unimak Island to Port Moller), the eastern portion Bristol Bay, and nearshore areas of the Pribilof and Saint Matthew Islands are locations known to be particularly important for king crab spawning and juvenile rearing.

Each life stage for stocks of BSAI crabs is concentrated at some combination of depth, habitat, geographic area, or time of year. Areas of known concentration of some species' life stages can be identified within the reported general distribution of several BSAI crab stocks. However, information to delineate areas of known concentration for each life stage is not available for many of the BSAI crabs.

The Crab Technical Team recommends that EFH be designated as the general distribution of a species' life stage. The reasons for selecting the general distribution even when known concentrations can be delineated include: 1) temporal variation in location of crab life stages within habitat; 2) resolution of habitat descriptions differs from known distributions of a crab species' life stage relative to habitat; 3) concentrations of mature crabs contracts and expands with decline and rise of population abundance likely changing the boundaries of known concentration; and 4) geographic areas with high concentration of a species' life stage are encompassed in the general distribution.

All crab species' life stages in the BSAI rely on habitat associated prey. From settling larvae to senescence, crabs dwell on the bottom and are dependent on benthic feeding. The importance of habitat quality to crab diet seems intuitive but is not quantified for benthic life stages. The team recognized change in diet due to habitat disturbance and alteration will impact crab survival and potentially long-term production.

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-Life History Traits for BSAI King and Tanner Crab Species

-Habitat Associations for BSAI King and Tanner Crab Species

EFH Definition for Red king crab

Egg - Level 1 & 2

See mature. Egg hatch of larvae is synchronized with the spring phytoplankton bloom in Southeast Alaska suggesting temporal sensitivity in the transition from benthic to planktonic habitat. Essential habitat of the red king crab egg stage is based on the general distribution (level 1) and habitat related density (level 2) of egg bearing red king crabs of the Bristol Bay, Pribilof Islands, Norton Sound and Dutch Harbor stocks. General distribution (level 1) of egg bearing female red king crab is used to identify essential habitat for the Adak stock.

Larvae - Level 0, Level 1 and Level 2

No EFH definition determined for the Norton Sound, Dutch Harbor and Adak stocks.

Red king crab larvae spend 2 - 3 months in pelagic larval stages before settling to the benthic life stage. Reverse diel migration and feeding patterns of larvae coincide with the distribution of food sources.

Essential habitat is identified for larvae of the Bristol Bay red king crab stock using the general distribution (level 1) and density (level 2) of larvae in the water column. Essential habitat is defined for larvae of the Pribilof Islands stock based on knowledge of the general distribution (level 1) of larvae in the water column. No essential habitat is defined for larvae of red king crab stocks in Norton Sound, Dutch Harbor and Adak waters.

Early Juvenile - Level 0, and Level 1

No EFH definition determined for the Northern District stock.

Early juvenile stage red king crabs are solitary and need high relief habitat or coarse substrate such as boulders, cobble, shell hash, and living substrates such as bryozoans and stalked ascidians. Young-of-the-year crabs occur at depths of 50 m or less. Essential habitat for early juveniles is defined for Bristol Bay red king crabs as the general distribution (level 1). No essential fish habitat is defined for red king crab early juveniles in Pribilof Islands, Norton Sound, Dutch Harbor and Adak stocks.

Late Juvenile - Level 0, and Level 2

No EFH definition determined for the Adak stock.

Late juvenile stage red king crabs of the ages of two and four years exhibit decreasing reliance on habitat and a tendency for the crab to form pods consisting of thousands of crabs. Podding generally continues until four years of age (about 6.5 cm), when the crab move to deeper water and join adults in the spring

migration to shallow water for molting and mating. Essential habitat based on general distribution (level 1) and density (level 2) of late juvenile red king crabs is known for Bristol Bay, Pribilof Islands, Norton Sound and Dutch Harbor stocks. Essential habitat is not defined for late juvenile red king crabs in the Adak stock.

Mature -Level 1 and 2

Mature red king crabs exhibit seasonal migration to shallow waters for reproduction. The remainder of the year red king crabs are found in deep waters. In Bristol Bay, red king crabs mate when they enter shallower waters (<50 m), generally beginning in January and continuing through June. Males grasp females just prior to female molting, after which the eggs (43,000 to 500,000 eggs) are fertilized and extruded on the female's abdomen. The female red king crab carries the eggs for 11 months before they hatch, generally in April. Essential habitat for mature red king crabs is known for Bristol Bay, Pribilof Islands, Norton Sound and Dutch Harbor stocks based on general distribution (level 1) and density (level 2). Essential habitat for mature red king crabs in Adak is known from general distribution data (level 1).

EFH Definition for Blue King Crab

Egg - Level 0_b, Level 1 and Level 2

See Mature. Essential habitat for eggs is known for the stock of blue king crab in the Pribilof Islands based on general distribution (level 1) and density (level 2) of egg bearing female crabs. Essential habitat for eggs of the St. Matthew Island blue king crab stock is based on general distribution (level 1) of the egg bearing females. Essential habitat for eggs of the St. Lawrence Island blue king crab stock is inferred from incidental catch of mature female crab.

Larvae - Level 0_c and Level 1

No EFH definition determined for the St. Matthew Island and St. Lawrence stocks.

Blue king crab larvae spend 3.5 to 4 months in pelagic larval stages before settling to the benthic life stage. Larvae are found in waters of depths between 40 to 60 m. Essential habitat of larval blue king crab of the Pribilof Islands stock is defined using the general distribution (level 1) of larvae in the water column. Information to define essential habitat is not available for the St. Matthew Island and St. Lawrence Island stocks of larval blue king crab.

Early Juvenile - Level 0_e and Level 2

No EFH definition determined for the St. Matthew and St. Lawrence Island stocks.

Early juvenile blue king crabs require refuge substrate characterized by gravel and cobble overlaid with shell hash, and sponge, hydroid and barnacle assemblages. These habitat areas have been found at 40-60 m around the Pribilof Islands. Essential habitat of early juvenile blue king crabs is based on general distribution (level 1) and density (level 2) of this life stage in the Pribilof Island stock. Information to define essential habitat for early juvenile blue king crabs in the St. Matthew Island and St. Lawrence Island stocks is not available.

Late Juvenile - Level 0_e, Level 1 and Level 2

NO EFH definition determined for the St. Lawrence Island stock.

Late juvenile blue king crab require nearshore rocky habitat with shell hash. Essential habitat is based on general distribution (level 1) and density (level 2) of late juvenile blue king crab of the Pribilof Islands stock. General distribution (level 1) of the late juvenile blue king crabs is used to identify essential habitat for the St. Matthew Island stock. Information is not available to define essential habitat for the St. Lawrence Island stock of late juvenile blue king crab.

Mature - Level 1 and Level 2

Mature blue king crabs occur most often between 45-75 m depth on mud-sand substrate adjacent to gravel rocky bottom. Female crabs are found in a habitat with a high percentage of shell hash. Mating occurs in mid-spring. Larger older females reproduce biennially while small females tend to reproduce annually. Fecundity of females range from 50,000-200,000 eggs per female. It has been suggested that spawning may depend on availability of nearshore rocky-cobble substrate for protection of females. Larger older crabs disperse farther offshore and are thought to migrate inshore for molting and mating. General distribution (level 1) and density (level 2) of mature blue king crab are used to identify essential habitat for the Pribilof Islands and St. Matthew Island stocks. Essential habitat of mature blue king crab is based on distribution (level 1) data for the St. Lawrence Island stock.

EFH Definition for Golden King Crab

Egg - Level 0, Level 1 and Level 2

No EFH definition determined for the Northern District stock.

See mature. General distribution (level 1) and density (level 2) of egg bearing female golden king crabs is used to identify essential habitat for the Sequam Pass stock. Essential habitat for the egg life stage of the Adak and Pribilof Islands stocks is based on general distribution (level 1) of the egg bearing female crabs.

Larvae - Level 0_c - No EFH definition determined

Information to define essential habitat of golden king crab larvae is not available for the Sequam Pass, Adak, Pribilof Islands or Northern District stocks.

Early Juvenile - Level 0_c - No EFH definition determined

Information to define essential habitat of early juvenile golden king crabs is not available for the Sequam Pass, Adak, Pribilof Islands or Northern District stocks.

Late Juvenile - Level 0_c, Level 1 and Level 2

No EFH definition determined for the Northern District stock.

Late juvenile golden king crabs are found throughout the depth range of the species. Abundance of late juvenile crab increases with depth and these crab are most abundant at depths >548 m. Essential habitat for late juvenile golden king crabs is based on general distribution (level 1) and density (level 2) of this life stage for the Sequam Pass stock. General distribution (level 1) of late juvenile golden king crabs is used to identify essential habitat for the Adak and Pribilof Islands stock. Information to define essential habitat is not available for late juvenile golden king crabs of the Northern District stock.

Mature - Level 0_c, and Level 2

No EFH definition determined for the Northern District stock.

Mature golden king crabs occur at all depths within their distribution. Males tend to congregate in somewhat shallower waters than females, and this segregation appears to be maintained throughout the year. Legal male crabs are most abundant between 274 m and 639 m. Abundance of sub-legal males increases at depth >364 m. Female abundance is greatest at intermediate depths between 274 m and 364 m. General distribution (level 1) and density (level 2) of mature golden king crabs are used to identify essential habitat for the Sequam Pass, Adak and Pribilof Islands stocks. Information is not available to define essential habitat for mature golden king crabs of the Northern district stock.

EFH Definition for Scarlet King Crab

Egg - Level 0_b

See Mature. Information for scarlet king crab eggs is not available for the Bering Sea, Adak or Dutch Harbor stocks. General distribution of the egg life stage, is inferred from incidental catch of mature females.

Larvae - Level 0_c - No EFH definition determined

Information to define essential habitat for scarlet king crab larvae is not available for the Bering Sea, Adak or Dutch Harbor stocks.

Early Juvenile - Level 0_c - No EFH definition determined

Information to define essential habitat for early juvenile scarlet king crabs is not available for the Bering Sea, Adak or Dutch Harbor stocks.

Late Juvenile - Level 0_c - No EFH definition determined

Information to define essential habitat for late juvenile scarlet king crabs is not available for the Bering Sea, Adak or Dutch Harbor stocks.

Mature - Level 1

Essential habitat for mature scarlet king crabs is based on the general distribution (level 1) of mature golden king crabs. Mature scarlet king crabs are caught incidentally in the golden king crab and *C. tanneri* fisheries.

EFH Definition for Tanner Crab (*C. bairdi*)

Egg - Level 0_b, Level 1 and Level 2

See mature. Essential habitat for eggs is known for the stocks of *C. bairdi* Tanner crabs in Bristol Bay and the Pribilof Islands based on general distribution (level 1) and density (level 2) of egg bearing female crabs. Essential habitat for eggs of the Eastern Aleutian *C. bairdi* Tanner crab stock is based on general distribution (level 1) of the egg bearing females. Essential habitat for eggs of the Western Aleutian *C. bairdi* Tanner crab stock is inferred from the general distribution of mature females.

Larvae - Level 0_c and Level 1

No EFH definition determined for the Eastern Aleutian and Western Aleutian stocks.

Larvae of *C. bairdi* Tanner crabs are typically found in Bering Sea Aleutian Island water column from 0 – 100 m in early summer. They are strong swimmers and perform diel migrations in the water column (down at night). They usually stay near the depth of the chlorophyll maximum during the day. The last larval stage settles onto the bottom mud. Essential habitat of *C. bairdi* Tanner crab larvae is based on general distribution (level 1) for the Bristol Bay and Pribilof Islands stocks. Information is not available to define essential habitat for larval *C. bairdi* Tanner crab in the Eastern Aleutian and Western Aleutian stocks.

Early Juvenile - Level 0_c and Level 1

No EFH definition determined for the Western Aleutian stock.

Early juvenile *C. bairdi* Tanner crabs occur at depths of 10 - 20 m in mud habitat in summer and are known to burrow or associate with many types of cover. Early juvenile *C. bairdi* Tanner crabs are not easily found in winter. Essential habitat of early juvenile *C. bairdi* Tanner crabs is identified by the general distribution (level 1) of this life stage for the Bristol Bay, Pribilof Islands, and Eastern Aleutian

stocks. Information to identify essential habitat of early juvenile *C. bairdi* Tanner crabs is not available for the Western Aleutian stock.

Late Juvenile - Level 0 and Level 1

No EFH definition determined for the Western Aleutian stock.

The preferred habitat for late juvenile *C. bairdi* Tanner crabs is mud. Late juvenile Tanner crabs migrate offshore of their early juvenile nursery habitat. Essential habitat of late juvenile *C. bairdi* Tanner crabs is based on the general distribution (level 1) and density (level 2) of this life stage for the Bristol Bay, Pribilof Islands, and Eastern Aleutian stocks. Information to identify essential habitat of late juvenile *C. bairdi* Tanner crabs is not available for the Western Aleutian stock.

Mature - Level 1 and Level 2

Mature *C. bairdi* Tanner crabs migrate inshore and mating is known to occur February through June. Mature female *C. bairdi* Tanner crabs have been observed in high density mating aggregations, or pods, consisting of hundreds of crabs per mound. These mounds may provide protection from predators and also attract males for mating. Mating need not occur every year, as female *C. bairdi* Tanner crabs can retain viable sperm in spermathecae up to 2 years or more. Females carry clutches of 50,000 to 400,000 eggs and nurture the embryos for one year after fertilization. Primiparous females may carry the fertilized eggs for as long as 1.5 years. Brooding occurs in 100-150 m depths. Essential habitat is based on the general distribution (level 1) and density (level 2) of mature *C. bairdi* Tanner crabs of the Bristol Bay, Pribilof Islands, and Eastern Aleutian stocks. Essential habitat of mature *C. bairdi* Tanner crabs is identified as the general distribution (level 1) for the Western Aleutian stock.

EFH Definition for Snow Crab (*C. opilio*)

Egg - Level 2

See Mature. Essential habitat for eggs is known for the stocks of *C. opilio* snow crabs in the Eastern Bering Sea based on general distribution (level 1) and density (level 2) of egg bearing female crabs.

Larvae - Level 1

Larvae of *C. opilio* snow crab are found in early summer and exhibit diel migration. The last of 3 larval stages settles onto bottom in nursery areas. Essential habitat is based on general distribution (level 1) of *C. opilio* snow crab larvae of the Eastern Bering Sea stock.

Early Juvenile - Level 1

Shallow water areas of the Eastern Bering Sea are considered nursery areas for *C. opilio* snow crabs and are confined to the mid-shelf area due to the thermal limits of early and late juvenile life stages. Essential habitat is identified as the general distribution (level 1) of early juvenile crabs of the Eastern Bering Sea stock of *C. opilio* snow crabs.

Late Juvenile - Level 2

A geographic cline in size of *C. opilio* snow crabs indicates a large number of morphometrically immature crabs occur in shallow waters less than 80 m. Essential habitat is based on the general distribution (level 1) and density (level 2) of juvenile crabs of the Eastern Bering Sea stock of *C. opilio* snow crabs.

Mature - Level 2

Female *C. opilio* snow crabs are acknowledged to attain terminal molt status at maturity. Primiparous female snow crabs mate January through June and may exhibit longer egg development period and lower fecundity than multiparous female crabs. Multiparous female snow crabs are able to store spermatophores in seminal vesicles and fertilize subsequent egg clutches without mating. At least two clutches can be fertilized from stored spermatophores, but the frequency of this occurring in nature is not known. Females carry clutches of approximately 36,000 eggs and nurture the embryos for approximately one year after fertilization. However, fecundity may decrease up to 50% between the time of egg extrusion and hatching presumably due to predation, parasitism, abrasion or decay of unfertilized eggs. Brooding probably occurs in depths greater than 50 m. Changes in proportion of morphometrically mature crabs by carapace width have been related to an interaction between cohort size and depth.

EFH Definition for Grooved Tanner Crab (*C. tanneri*)**Egg - Level 0_b**

See Mature. Information for grooved Tanner crab eggs is not available for the Bering Sea, Eastern Aleutian or Western Aleutian stocks. General distribution of the egg life stage is inferred from the distribution of mature females.

Larvae - Level 0_c - No EFH definition determined

Information to define essential habitat for larvae of grooved Tanner crabs is not available for the Bering Sea, Eastern Aleutian or Western Aleutian stocks.

Early Juvenile - Level 0_c - No EFH definition determined

Information to define essential habitat for early juvenile grooved Tanner crabs is not available for the Bering Sea, Eastern Aleutian, or Western Aleutian stocks.

Late Juvenile - Level 0_c - No EFH definition determined

Information to define essential habitat for late juvenile grooved Tanner crabs is not available for the Bering Sea, Eastern Aleutian, or Western Aleutian stocks.

Mature - Level 1

In the Eastern Bering Sea mature male grooved Tanner crabs may be found somewhat more shallow than mature females but male and female crabs don't show clear segregation by depth. General distribution (level 1) of mature grooved Tanner crabs is used to identify essential habitat of the Bering Sea, Eastern Aleutian, and Western Aleutian stocks.

EFH Definition for Triangle Tanner Crab (*C. angulatus*)**Egg - Level 1 - No EFH definition determined**

See Mature. General distribution (level 1) of mature triangle Tanner crabs is used to identify essential habitat of the Bristol Bay and Eastern Aleutian stocks.

Larvae - Level 0_c - No EFH definition determined

Information to define essential habitat for larvae of triangle Tanner crabs is not available for the Bristol Bay or Eastern Aleutian stocks.

Early Juvenile - Level 0_c - No EFH definition determined

Information to define essential habitat for early juvenile triangle Tanner crabs is not available for the Bristol Bay or Eastern Aleutian stocks.

Late Juvenile - Level 0_c - No EFH definition determined

Information to define essential habitat for late juvenile triangle Tanner crabs is not available for the Bristol Bay or Eastern Aleutian stocks.

Mature - Level 1

The mean depth of mature male triangle Tanner crabs (647 m) is significantly less than for mature females (748 m) indicating some pattern of sexual segregation by depth. General distribution (level 1) of mature triangle Tanner crabs is used to identify essential habitat of the Bristol Bay and Eastern Aleutian stocks.

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